World Agroforestry Centre

KEY MESSAGES

- Climate-smart agriculture (CSA) offers a flexible, systematic approach to climate change, with interventions designed to fit a wide variety of local environmental and social contexts.
- The World Agroforestry Centre (ICRAF) uses big data and participatory approaches to help development partners determine what will work where and to increase the efficiency of CSA programs.

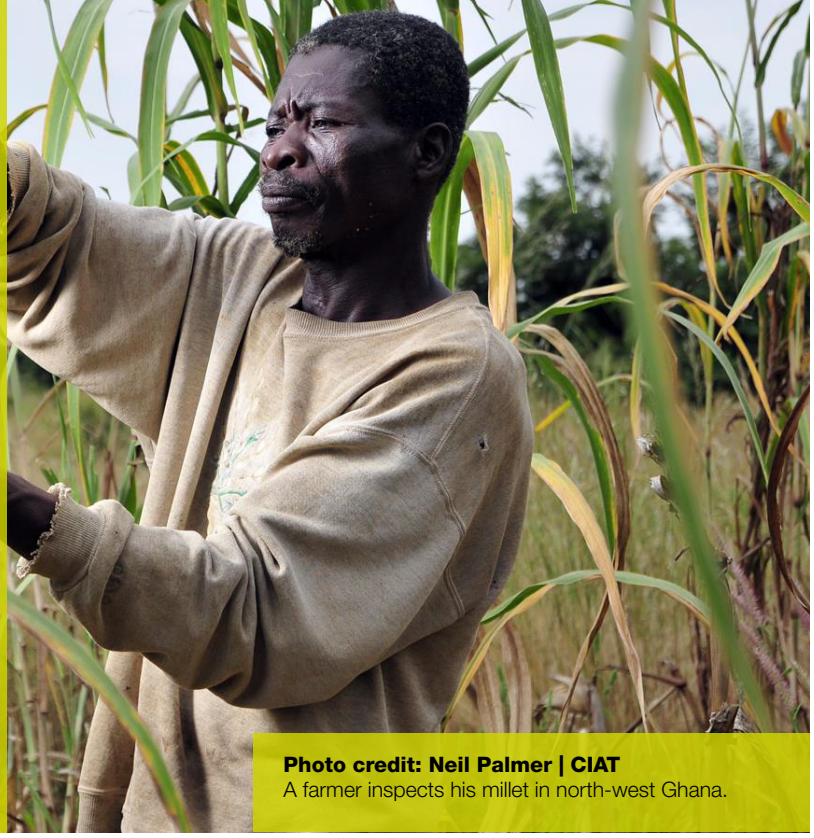

Photo credit: Neil Palmer | CIAT
A farmer inspects his millet in north-west Ghana.

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What works where

Introduction

Climate-smart agriculture (CSA) is an approach to simultaneously addresses challenges of food security and climate change. It aims to increase agricultural productivity in sustainable ways, improve climate resilience, and mitigate greenhouse gas (GHG) emissions or sequester carbon. CSA promotes solutions relevant to specific contexts rather than prescribing specific interventions, thus offering the flexibility needed to create the necessary change in many locations.

One of the key advantages of CSA, its flexibility, also makes programming and implementation challenging. There are no one-size-fits-all CSA solutions. CSA interventions are inherently place-based and time-specific, because yields, soil health, economics, and farmer's needs and capacities vary according to the environmental and social conditions, which change over time.

This brief targets policy makers and program developers and offers insights into how to determine which CSA practices are most suitable to the local conditions. We present participatory methodologies and a data-driven approach used in the intervention selection process. Both approaches offer ways to determine which CSA practices are likely to work best in specific contexts, thus increasing the efficiency of development funding and improving the lives and livelihoods of more people.

Farmer-centric

The needs and desires of farmers lie at the core of CSA. Farmers should, therefore, play a central role in the decision-making process from the start, so that their experiences and preferences can guide the choice of appropriate innovations. ICRAF programs have demonstrated the value of building on this local knowledge and listening to farmers in the selection of CSA interventions.

Participatory selection of agricultural interventions is not new. ICRAF, however, has examined the problem through a climate-smart lens, focusing on management of natural resources. In hilly zones of Vietnam, for example, where agriculture is dominated by maize and cassava monocultures, the increased frequency of extreme weather events—including heavy rains—often lead to flash floods and landslides, resulting in profound economic damages. In partnership with national stakeholders, ICRAF scientists worked closely with farmers to design trials of different agroforestry systems with the goal of preserving soil and diversifying incomes through perennial crops. This participatory process evaluated the best of both scientific and local knowledge, increasing the efficacy of the trial and the commitment of farmers to learning from and applying the knowledge gained. The success of this approach can be seen by farmers remaining in the existing programs.

Across five countries in West Africa (Burkina Faso, Ghana, Mali, Niger, and Senegal), scientists at ICRAF and farmers created and ranked an inventory of potential climate-smart practices linked to the three CSA pillars and the socio-ecological contexts, selected practices based on the climate forecast

and tested these in field trials and evaluated benefits, costs and farmer interest in adopting these practices. The trials, designed with input from farmers, included weather forecast and market information sharing through mobile phone apps, soil and water conservation, testing of drought-tolerant crop varieties, value-chain development of key products, and analysis of

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changes in behavior among participants. Results indicated that the CSA practices that farmers were most interested in were those that focused on individual farmers (rather than collective) and that improved the efficiency and sustainability of existing local practices such as zai pits (rather than introducing new technologies such as irrigation). These results provide a clear target for program developers in the region.

The key value of the experience in Vietnam and West Africa was in demonstrating and learning about the benefits of the CSA approach with farmers and researcher together. Successful CSA must be based on farmers' deep knowledge of what works in the local context.

The World Agroforestry Centre (ICRAF) uses big data and participatory approaches to help development partners determine what will work where and to increase the efficiency of CSA programs.

Data-driven

The evidence for effectiveness of CSA generally comes in the form of case studies, anecdotes or aggregate data. Little empirical evidence has been compiled and made available, forcing program developers to rely on their own best guesses. In response, ICRAF developed the CSA Compendium, the most comprehensive database on agricultural technologies compiled to date. The database combines results from many research studies to investigate the impact of potential climate-smart technologies on productivity, resilience and mitigation under variable environmental and social conditions.

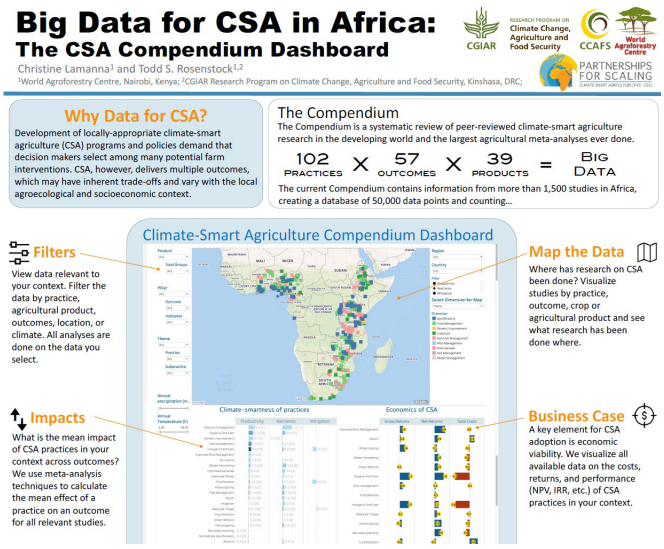
The CSA Compendium allows researchers to quickly interrogate the evidence base to compare potential CSA approaches against conventional management practices. The data are mixed with other datasets on soils, climate and social parameters to provide practical answers to many questions typically asked by development partners, such as: Where are CSA practices likely to work, and for whom? Does a CSA practice produce synergies (in which two outcomes improve in tandem) or trade-offs (where improvement in one outcome leads to decline in another)? What are the barriers to adoption of CSA practices? The database will be available online in 2019 (figure 1).

The CSA Compendium offers a methodological breakthrough, a novel way to use big data to improve understanding and outcomes for actors in the agriculture and environment development fields. So far, the CSA Compendium is being used in participatory processes to help select technologies for investment with development programs with governments in East Africa; build capacity of actors ranging from extension officers to ministry officials about economic, environmental and social trade-offs in Southern Africa; and develop novel insurance products available to farmers at lower premiums.

Conclusion

CSA programs must be tailored to each local context. ICRAF's experience thus far has shown that it is possible to prioritize farmer-centric and scientifically robust CSA interventions that will increase the likelihood of producing the best outcomes for farmers. Methods and tools that ICRAF has developed—farmer-selection and big data—are applicable to a range of intervention selection problems. More information can be found at the links below. Contact the lead authors of the papers below for specific information about each approach or Todd Rosenstock (t.rosenstock@cgiar.org) for information on CSA activities at ICRAF.

Figure 1. The Beta-version of an interactive dashboard where stakeholders can interrogate the Compendium.



Further reading:

Lamanna C. et al. 2015. Evidence-based opportunities for outscaling climate-smart agriculture in East Africa. CCAFS Working Paper no. 172. Available at: https://bit.ly/2E9dllv

Rosenstock T.S. et al. 2015. The scientific basis of climate-smart agriculture: A systematic review protocol. CCAFS Working Paper no. 136. Available at: https://bit.ly/2RHeVPn

Bayala J et al. 2016. Towards developing scalable climate-smart village models: approach and lessons learnt from pilot research in West Africa. ICRAF Occasional Paper No. 25. Available at: https://bit.ly/2RHf2uh

Bayala J et al. 2018. Editorial for the thematic series in agriculture & food security: Climate-smart agriculture technologies in West Africa: learning from the ground AR4D experiences. Available at: https://bit.ly/2G5dSHE

Duong MT, Simelton E, Le VH. 2016. Participatory selection of climate-smart agriculture priorities. CCAFS Working Paper no. 175. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Available at: https://bit.ly/2RFukzF